

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings of claims in the application. Applicant has submitted a new complete claim set showing marked up claims with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing.

**Listing of Claims:**

## 1. (Currently Amended) A method comprising:

determining a first cost associated with a logical network link between an active node and a first neighboring node of the active node within an overlay network, the active node and the first neighboring node communicating through one or more

physical network links, the overlay network comprising nodes with application-level interconnections that form the overlay network, where the nodes exchange application-level communications via the interconnections, and where the application-level communications are transmitted via a data network that the logical network overlays;

determining a second cost associated with a proposed logical network link between the first neighboring node and a second neighboring node of the active node within the overlay network, the first neighboring node and the second neighboring node communicating through one or more physical network links; and

reorganizing the overlay network to replace the logical network link with the proposed logical network link in the overlay network with a reorganization probability based on the first and second costs and the size of a neighbor list of the active node, the size of a neighbor list of the first neighboring node, and the size of a neighbor list of the second neighboring node.

Type of Response: Non-Final Office Action of 03/23/2007

Application Number: 10/698,846

Attorney Docket Number: 304871.02

Filing Date: 10/30/2003

2. (Original) The method of claim 1 wherein the reorganization probability is dependent upon a change in an energy function caused by replacing the logical network link with the proposed logical network link in the overlay network.

3. (Original) The method of claim 1 wherein determining the first cost comprises:

measuring a round trip delay time between the active node and the first neighboring node of the active node within the overlay network.

4. (Original) The method of claim 1 wherein determining the second cost comprises:

triggering a measurement of a round trip delay time between the first and second neighboring nodes of the active node within the overlay network.

5. (Original) The method of claim 1 wherein determining the first cost comprises:

determining an available bandwidth in the logical network link between the active node and the first neighboring node of the active node within the overlay network.

6. (Original) The method of claim 1 wherein determining the second cost comprises:

determining available bandwidth in the proposed logical network link between the first and second neighboring nodes of the active node within the overlay network.

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7. (Original) The method of claim 1 further comprising:  
randomly selecting the first neighboring node of the active node from a local address list of the active node.

8. (Original) The method of claim 1 wherein the overlay network is an unstructured overlay network.

9. (Original) The method of claim 1 further comprising:  
restricting a subset of neighboring nodes of the active node from reorganization.

10. (Currently Amended) A computer program product encoding a computer program for executing on a computer system a computer process, the computer process comprising:  
determining a first cost associated with a logical network link between an active node and a first neighboring node of the active node within an overlay network, the active node and the first neighboring node communicating through one or more physical network links, wherein the overlay network comprises a peer-to-peer network of nodes with respective IP addresses, where some nodes have links to other nodes, the links comprising the IP addresses of the corresponding nodes, where the nodes exchange application-level communications via the peer-to-peer network, and where the application-level communications are transmitted via an IP network;  
determining a second cost associated with a proposed logical network link between the first neighboring node and a second neighboring node of the active node within the overlay network, the first neighboring node and the second neighboring node communicating through one or more physical network links; and

Type of Response: Non-Final Office Action of 03/23/2007  
Application Number: 10/698,846  
Attorney Docket Number: 304871.02  
Filing Date: 10/30/2003

reorganizing the overlay network to replace the logical network link with the proposed logical network link in the overlay network with a reorganization probability based on the first and second costs and the size of a neighbor list of the active node, the size of a neighbor list of the first neighboring node, and the size of a neighbor list of the second neighboring node.

11. (Original) The computer program product of claim 10 wherein the reorganization probability is dependent upon a change in an energy function caused by replacing the logical network link with the proposed logical network link in the overlay network.

12. (Original) The computer program product of claim 10 wherein determining the first cost comprises:

measuring a round trip delay time between the active node and the first neighboring node of the active node within the overlay network.

13. (Original) The computer program product of claim 10 wherein determining the second cost comprises:

triggering a measurement of a round trip delay time between the first and second neighboring nodes of the active node within the overlay network.

14. (Original) The computer program product of claim 10 wherein determining the first cost comprises:

determining an available bandwidth in the logical network link between the active node and the first neighboring node of the active node within the overlay network.

Type of Response: Non-Final Office Action of 03/23/2007  
Application Number: 10/698,846  
Attorney Docket Number: 304871.02  
Filing Date: 10/30/2003

15. (Original) The computer program product of claim 10 wherein determining the second cost comprises:

determining available bandwidth in the proposed logical network link between the first and second neighboring nodes of the active node within the overlay network.

16. (Original) The computer program product of claim 10 wherein the computer process further comprises:

randomly selecting the first neighboring node of the active node from a local address list of the active node.

17. (Original) The computer program product of claim 10 wherein the overlay network is an unstructured overlay network.

18. (Original) The computer program product of claim 10 wherein the computer process further comprises:

restricting a subset of neighboring nodes of the active node from reorganization.

19. (Currently Amended) A system comprising:

a cost computing module determining a first cost associated with a logical network link between an active node and a first neighboring node of the active node within an overlay network, the active node and the first neighboring node

communicating through one or more physical network links a data network through which the nodes exchange network communications, and determining a second cost associated with a proposed logical network link between the first neighboring node and a second neighboring node of the active node within the overlay network, the first

Type of Response: Non-Final Office Action of 03/23/2007

Application Number: 10/698,846

Attorney Docket Number: 304871.02

Filing Date: 10/30/2003

neighboring node and the second neighboring node communicating through one or more physical network linksthe data network, where logical network links comprise information that enables nodes to address network communications to other nodes; and

a reorganization module reorganizing the overlay network to replace the logical network link with the proposed logical network link in the overlay network with a reorganization probability based on the first and second costs and the size of a neighbor list of the active node, the size of a neighbor list of the first neighboring node, and the size of a neighbor list of the second neighboring node.

20. (Original) The system of claim 19 wherein the reorganization probability is dependent upon a change in an energy function caused by replacing the logical network link with the proposed logical network link in the overlay network.

21. (Original) The system of claim 19 wherein the first cost includes a round trip delay time between the active node and the first neighboring node of the active node within the overlay network.

22. (Original) The system of claim 19 wherein the second cost includes a round trip delay time between the first and second neighboring nodes of the active node within the overlay network.

23. (Original) The system of claim 19 wherein the first cost includes available bandwidth in the logical network link between the active node and the first neighboring node of the active node within the overlay network.

Type of Response: Non-Final Office Action of 03/23/2007  
Application Number: 10/698,846  
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Filing Date: 10/30/2003

24. (Original) The system of claim 19 wherein the second cost includes available bandwidth in the proposed logical network link between the first and second neighboring nodes of the active node within the overlay network.

25. (Original) The system of claim 19 further comprising:  
a neighborhood node selector randomly selecting the first neighboring node of the active node from a local address list of the active node.

26. (Original) The system of claim 19 wherein the overlay network is an unstructured overlay network.

27. (Original) The system of claim 19 wherein the first and second neighboring nodes of the active node are selected from a neighbor list maintained by the active node.

28. (Original) The system of claim 19 wherein the first and second neighboring nodes of the active node are selected from a neighbor list and further comprising:  
an isolated neighbor list restricting a subset of neighbor nodes of the active node from reorganization.